



AIP

report

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EMPLOYMENT SURVEY 1980

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To assess the employment opportunities for new physicists as accurately as possible it is necessary to allow a reasonable period of time for the degree recipients to explore the job market and start their careers. Since the largest number of degrees are granted in May and June of each year, by conducting the Employment Survey in December, we allow the employment-oriented graduates a minimum of six months to select and get involved in their employment.

Each respondent to this survey is a graduate who was granted a physics degree between July 1979 and June 1980, and who indicated in one of two surveys during the summer of 1980 that he or she is interested in employment. Naturally, many of the graduates among the summer respondents had already started their employment. But those 12%, 10% and 4% of the new physics bachelors, masters, and doctors respectively who had been uncommitted in the summer of 1980 were now in a position to evaluate their employment choices.

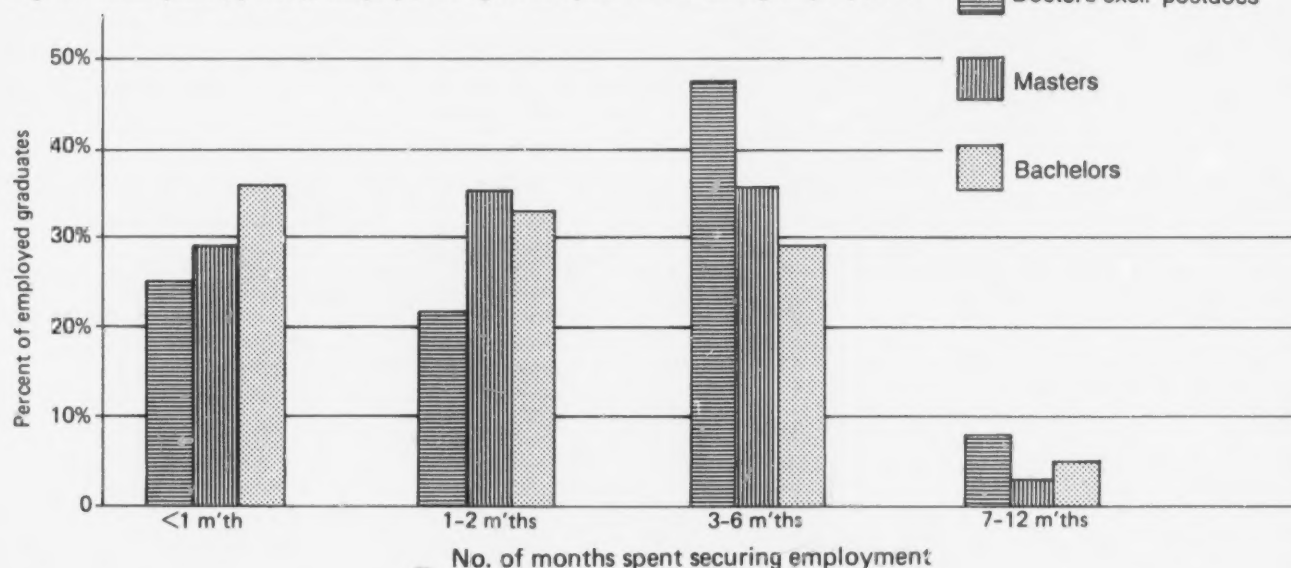
Highlights of this report are:

- 1) The majority of doctoral physicists takes three months or longer to accept potentially permanent positions.

- 2) Both physicists and astronomers increased their proportions of women and foreign degree recipients.
- 3) Fewer doctoral physicists changed subfields as they accepted potentially permanent positions.

Figure 1 addresses itself to the question of how long does it take a graduate to secure initial employment which he or she can classify as potentially permanent; for that reason 'postdocs' are excluded from Figure 1 as noted in its key. The general conclusion one can draw from this figure is that the majority of bachelors and masters requires two months or less to accept suitable employment while the majority of doctoral graduates takes three months or longer before accepting potentially permanent positions. To be more specific, it is 71% of the bachelors, 64% of the masters and 46% of the doctors who reported spending two months or less to secure employment. Those three percentages show little change from the previous year. However, by distinguishing between taking one to two months, or less than one month, we find a significant change for the bachelors and masters from what they reported in the previous year. The notation "<1 month" in Figure 1 describes those degree recipients

Fig. 1. Time spent by 1979-80 physics degree recipients in securing employment



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Table I. Changes in occupational status of physics degree recipients between the summer of 1980 and the following winter.

Employment status reported by physics degree recipients, summer 1980	Occupational status, winter 1980-81					
	Doctors	'Postdoc' or student	Full-time employed	Employed p-t, temp., other	Not empl. and seeking	Total N %
Newly accepted empl.	14	138	-	-	152	41
Continuing employment	2	30	-	-	32	9
'Postdoc'	126	25	-	-	151	41
Other	6	11	-	-	17	5
Not empl. and seeking	2	11	-	2	15	4
Total respondents	N	150	215	-	2	367
	%	41	59	-	<1	100%
Masters						
Newly accepted empl.	2	91	2	1	96	59
Continuing employment	1	24	4	5	34	21
Career military	-	11	-	-	11	7
Other	1	3	-	-	4	2
Not empl. and seeking	-	11	4	3	18	11
Total respondents	N	4	140	10	9	163
	%	2	86	6	6	100%
Bachelors						
Newly accepted empl.	4	423	6	5	438	57
Continuing employment	-	92	3	1	96	13
Military service	-	74	3	-	77	10
Other (vol., temp.)	5	3	4	-	12	2
Will be seeking empl.	4	18	9	9	40	5
Not empl. and seeking	3	68	16	13	100	13
Total respondents	N	16	678	41	28	763
	%	2	89	5	4	100%

who have positions lined-up at the time of graduation; the proportions of bachelors and masters in that category declined by 20% and 10% respectively. Our interpretation of this change, based on the graduates' comments, is that non-doctoral graduates felt more relaxed about their employment opportunities and preferred to wait until after graduation before concentrating on the task of securing a position.

As a follow-up survey, the Employment Survey measures changes in occupational status over the six month period from the summer of 1980 to the winter of 1980-81; Tables I and II highlight these changes for new physics and astronomy graduates respectively. Of major interest is always the change in occupational status of the uncommitted graduates; thus Table I shows how 4%, 11% and 13%, depicting the groups of physics doctors, masters and bachelors who were not employed and seeking employment in the summer of 1980, declined to <1%, 6% and 4% respectively when contacted six months later. The total number of astronomy respondents at all three levels was only 105 among whom 4 doctors, 3 masters and 8 bachelors were unemployed in the summer of 1980. By the following winter only 3 of those 15 graduates were still seeking employment, but 2 doctors and one bachelor, previously employed, were in between jobs in the winter of 1980-81 yielding a total of 6 unemployed.

Table III singles out the doctoral physicists and astronomers to determine whether any of five major characteristics was influential in the type of employment they accepted; namely temporary postdoctoral fellowships or potentially permanent employment. For both physicists and astronomers it appears that theoreticians are more likely to be offered 'postdocs' than permanent positions, and a higher proportion of the younger doctorate recipients accepted 'postdocs' rather than permanent positions. The subfield chosen for the dissertation does not appear as influential in determining the type of employment for the 1980 graduates as it did in the previous year when far fewer high energy and nuclear physicists were offered permanent employment than 'postdocs'. Plasma physicists merely increased the proportions in which they accepted permanent positions. For astronomers the situation is different because the majority (60%) of doctoral graduates accept 'postdocs', especially those whose dissertation subfields were stellar atmospheres and spectra, or cosmology.

Both physicists and astronomers raised their proportion of women and foreign degree recipients; more women physicists were offered permanent employment than 'postdocs'.

Table II. Changes in occupational status of astronomy degree recipients between the summer of 1980 and the following winter.

		'Postdoc' or student	Full-time employed	Not employed and seeking	Total	
					N	%
Doctors	Newly accepted empl.	3	8	-	11	18
	Continuing employment	3	5	1	9	15
	'Postdoc'	29	8	1	38	61
	Not empl. and seeking	1	3	-	4	6
	Total respondents	N 36 % 58	24 39	2 3	62	100%
Masters						
Masters	Newly accepted empl.	-	7	-	7	50
	Cont., incl. military	2	2	-	4	29
	Not empl. and seeking	-	2	1	3	21
	Total respondents	N 2 % 14	11 79	1 7	14	100%
Bachelors						
Bachelors	Newly accepted empl.	1	12	1	14	46
	Cont., incl. military	1	4	-	5	17
	Temporary empl.	1	2	-	3	10
	Not empl. and seeking	1	5	2	8	27
	Total respondents	N 4 % 13	23 77	3 10	30	100%

Table III. Characteristics of postdoctoral and full-time employed physics and astronomy doctorate recipients, 1979-80.

Characteristics	Physics		Astronomy		Characteristics
	'Postdocs'	Full-time employed	'Postdocs'	Full-time employed	
Sex					Sex
Female	5%	7%	14%	25%	Female
Male	95	93	86	75	Male
Age					Age
26 or younger	9%	8%	6%	-	26 or younger
27 yrs.	18	10	14	12%	27 yrs.
28 yrs.	26	19	30	13	28 yrs.
29 yrs.	18	13	17	17	29 yrs.
30 yrs.	7	9	14	8	30 yrs.
31-32 yrs.	11	16	14	21	31-32 yrs.
33 or older	11	25	5	29	33 or older
Citizenship					Citizenship
U.S.	74%	83%	87%	83%	U.S.
Foreign	26	17	13	17	Foreign
Type of research					Type of research
Experimental	52%	56%	39%	58%	Observational
Theoretical	38	25	33	17	Theoretical
Both	10	19	23	25	Both
Major subfields					Major subfields
Astrophysics	4%	4%	-	8%	Astronomical instruments and techniques
Electron, atomic & molec.	7	6	11%	13	Astrophysics:
Elem. particles	17	13	17	13	Cosmology, extragalactic, quasi-stellar objects
Math. physics	9	4	14	13	Interstellar matter and gaseous nebulae
Nuclear	14	12	-	4	Solar system, space astronomy of the solar system
Plasma	4	11	45	25	Stellar atmospheres and spectra, stellar evolution, solar and stellar interiors
Solid state	32	30	13	24	Other
Number of respondents	150	215	36	24	

Fig. 11. Employment status of 1979-80 doctoral physicists 6-18 months after graduation.



After having distinguished between doctoral physicists who accepted 'postdocs' and those who chose potentially permanent initial employment, we asked each group a different set of questions. For example, postdoctoral fellowships are temporary and low-paying but to many graduates they offer an opportunity to continue the research of their dissertations. Thus it may be of interest to know how many physicists spe-

cifically sought those fellowships and even declined other offers to accept them. On the other hand, appropriate questions for physicists who had accepted permanent positions, concern the type of work and the prospect of having to change subfields. Figure 11 summarizes the response from both groups. The 107 degree recipients in the "same subfield" represent a notable increase from the previous year.

Table IV. Subfield mobility of doctoral level physicists, 1979-80.

Major subfields of dissertation	'Postdocs'		Graduates with potentially permanent positions	
	Number responding	% of respondents holding 'postdocs' in same subfield	Number responding	% of respondents employed in same subfield
Astrophysics	6	83%	*	*
Elem. particles	25	92	19	42%
Electron, atomic & molec.	11	82	8	38
Nuclear	21	95	20	35
Optics	*	*	9	89
Plasma	6	83	24	87
Solid state	48	92	58	64
Cross disciplinary	*	*	11	73
All subfields combined	146	80%	107	50%

*Too few respondents

But exactly which subfields are in demand when examining permanent employment, is shown in Table IV. This table lists major subfields of the dissertations and shows that for subfields like plasma or optics a very high proportion of graduates secure potentially permanent positions.

Since the late 1970's postdoctoral fellowships appear to be offered for longer periods of time, perhaps because there are fewer graduates to take them. Table V relates the lengths of physics fellowships to three characteristics of their recipients.

Citizenship is the first characteristic listed and it is evident from the distribution shown in the table that a higher proportion of foreign degree recipients was offered shorter 'postdocs'. Subfields seem to have little influence on the lengths of fellowships with the possible exception of elementary particles, 20% of whose graduates get the longer three-year 'postdocs'. And of those 113 new physicists who specifically sought 'postdocs' one third accepted fellowships of at most one year's duration.

Table V. Factors influencing the length of postdoctoral fellowships for 1979-80 doctoral level physicists.

Characteristics			Length of 'postdoc'			Total	
			1 yr.	1.5 to 2 yrs.	>2 yrs.	%	N
Citizenship	U.S.		35%	55%	10%	100%	111
	Foreign		43	46	11	100	39
Selected subfields of PhD	Electron, atomic & molec.		14%	72%	14	100%	7
	Elem. particles		28	52	20	100	25
	Nuclear physics		56	39	5	100	18
	Plasma physics		67	33	-	100	6
	Solid state		30	68	2	100	43
Plan	Specifically sought 'postdoc'	yes	32%	56%	12%	100%	113
		no	50	50	-	100	37
Total respondents			N	52	85	13	150
			%	35	57	8	100%

Table VI. Employment with potential permanence accepted by 1979-80 doctorate recipients.

		Univ.	4-yr. coll.	Industry	Gov't	FFRC	Other	N	%
Subfield of PhD	Cross disciplinary	5	-	8	3	-	1	17	8%
	Electron, atomic, molecular	2	-	9	-	-	-	11	5
	Elementary particles	8	2	12	-	4	1	27	13
	Nuclear	6	1	13	2	2	-	24	11
	Optics	-	-	7	1	2	-	10	5
	Plasma	3	-	7	3	10	1	24	11
	Solid state	9	2	40	9	4	3	67	31
	Other	10	2	12	7	1	3	35	16
Work activity	Teaching	7	5	-	-	-	-	12	6%
	Research	19	-	20	13	12	1	65	30
	Teaching & research	15	2	-	-	1	-	18	8
	Res./development/design	1	-	71	12	9	4	97	45
	Computer science	1	-	10	-	-	-	11	5
	Other	-	-	7	-	1	4	12	6
Physics related work	Same subfield	34	2	36	16	16	3	107	50%
	Different subfield	9	3	44	8	7	2	73	34
Unrelated to physics	Research-oriented	-	-	13	-	-	1	14	6
	New area	-	1	10	-	-	1	12	6
	Other	-	1	5	1	-	2	9	4
Total respondents		43	7	108	25	23	9	215	
		N	%						100%
		20	3	50	12	11	4		

The employment of new doctoral physicists, who chose potentially permanent positions, is presented in Table VI; as expected, industry accounts for half of the positions accepted. Pure research positions, as distinct from those involving research and development, were reported by 30% of the physicists and that employment was almost equally divided among universities, industry and the government. Academic faculty positions again make up one-quarter of the offers that carry potential permanence and include very few straight teaching positions at 4-year colleges. The proportion of high energy physicists among those who accepted permanent positions had doubled in the last year as university demand expanded.

While acknowledging that the number of women and foreign physics masters is small, the members of neither group were among those who were still unemployed and seeking when

this follow-up survey was conducted. Among the characteristics listed in Tables VII and VIII the type of institution attended appears to be more influential in determining one's initial employment than any of the other characteristics shown. Examining the data we find that graduates from the master's institutions find employment in a shorter time than those from the PhD-institutions, but are a little less likely to secure full-time permanent work.

Another aspect one might consider is whether or not a position is physics-related. Although four out of five new masters start employment in physics-related positions, it takes somewhat longer to secure such positions than those that make less use of a master's physics training, according to Table VIII. Of the 21 masters who teach, most of them do so at the college level.

Table VII. Background characteristics and employment status of 1979-80 masters.

Characteristics		Employment full-time	part-time temp., other	Unemployed and seeking		N	%
Sex	Female	70%	30%	-	100%	15	9%
	Male	87	7	6%	100	148	91
Citizenship	U.S.	89%	5%	6%	100%	149	91%
	Foreign	50	50	-	100	14	9
Age	23 or younger	100%	-	-	100%	7	4%
	24 yrs.	93	-	7%	100	29	18
	25 yrs.	80	13%	7	100	36	22
	26 yrs.	90	5	5	100	20	12
	27-28 yrs.	85	4	11	100	27	17
	29 or older	91	7	2	100	44	27
Type of institution last attended	Doctorate-granting	88%	7%	5%	100%	120	75%
	Master's-granting	79	14	7	100	43	25
Major subfields	Physics education	92%	-	8%	100%	12	7%
	Electron, atomic and molecular	69	31%	-	100	13	8
	Optics	77	10	13	100	30	18
	Solid state	88	6	6	100	32	20
	General physics	81	19	-	100	21	13
Total respondents	N	140	14	9		163	
	%	86	8	6			100%

Table VIII. Characteristics of 1979-80 physics masters that influence the time required to secure employment.

Characteristics		Time spent finding employment					Total	
		<1 mo.	1-2 mos.	3-6 mos.	7-12 mos.		N	%
Sex	Female	27%	46%	27%	-	100%	15	10%
	Male	29	33	34	4%	100	139	90
Age	23 or younger	12%	50%	38%	-	100%	7	4%
	24 yrs.	15	54	27	4%	100	27	18
	25 yrs.	29	32	39	-	100	31	20
	26 yrs.	16	32	42	10	100	19	12
	27-28 yrs.	31	27	42	-	100	27	18
	29 or older	43	27	25	5	100	43	28
Type of graduate institution	Doctorate-granting	28%	32%	38%	2%	100%	114	74%
	Master's-granting	30	43	23	4	100	40	26
Type of employment	Physics related	31%	31%	36%	2%	100%	120	78%
	Unrelated to physics	24	47	23	6	100	14	22
Major employer	Industry	17%	44%	36%	3%	100%	18	57%
	Government	48	18	32	2	100	38	25
	High school	28	29	29	14	100	7	5
	College/univ.	54	13	33	-	100	15	10
Major work activities	Teaching	38%	24%	33%	5%	100%	21	14%
	Res & dev.	32	30	34	4	100	53	34
	Engineering	22	47	31	-	100	46	30
	Programming	19	44	37	-	100	17	11
Total respondents	N	44	52	53	5		154	
	%	29	34	34	3			100%

Table IX. Characteristics of 1979-80 physics bachelors that influence the time required to secure employment.

Characteristics		Time spent finding employment					Total	
		<1 mo.	1-2 mos.	3-6 mos.	7-12 mos.		N	%
Sex	Female	34%	35%	30%	1%	100%	105	15%
	Male	36	32	29	3	100	614	85
Age	21 or younger	24%	48%	28%	-	100%	29	4%
	22 yrs.	34	32	31	3%	100	332	46
	23 yrs.	40	32	25	3	100	151	21
	24-25 yrs.	33	38	25	4	100	103	14
	26-29 yrs.	37	28	35	-	100	68	10
	30 or older	45	20	35	-	100	36	5
Type of bachelor's institution	Doctorate-granting	32%	35%	29%	4%	100%	326	45%
	Master's-granting	28	27	41	4	100	80	11
	Bachelor's-granting	41	31	27	1	100	313	44
Type of employment	Physics related	31%	34%	31%	4%	100%	452	63%
	Unrelated to physics	43	30	26	1	100	267	37
Major employer	Industry	28%	37%	32%	3%	100%	463	63%
	High school	38	43	19	-	100	21	3
	University	32	36	32	-	100	29	4
	Government	34	28	34	4	100	82	11
	Military	84	7	8	1	100	90	13
Major work activity	Computer programming	33%	39%	27%	1%	100%	133	18%
	Data analysis/quality control	22	33	40	5	100	116	16
	Res./dev./design	26	35	35	4	100	246	34
	Teaching	41	31	22	6	100	32	4
Total respondents	N	255	234	210	20		719	
	%	35	33	29	3			100%

New bachelors experienced a set of circumstances similar to those experienced by the masters: it takes a little longer to secure a physics related position, than one that is unrelated to physics. But looking at the first characteristic listed in Table IX, we find that there is no difference between men and women in the time spent by graduates who are looking for employment. As mentioned earlier it is the type of institution which granted the physics bachelor's degree that appears to make a difference; the highest proportion of graduates with employment lined up at the time of graduation is that from the four-year colleges. When asked for an evaluation, almost 80% of the masters as well as the bachelors found their initial employment challenging.

As the academic year ended in June 1980 an estimated 70 out of 165 astronomy bachelors were interested in immediate employment rather than pursuing a career in astronomy. But to this follow-up survey six months later only 24 graduates contributed their employment information which is summarized in Table X. Almost half of that group found astronomy-related work, and reported a higher salary than those graduates who accepted positions whose work was unrelated to astronomy. That was not true in the previous year when salaries for astronomy related work were lower.

Table X. Employment of 1979-80 astronomy bachelors.

Work activity	Type of employer				N	%	Median monthly salary
	Industry	Gov't incl. mil.	Coll./ Univ.	High school			
Astronomy related:							
Data analysis	1	1	2	-	4	46%	\$1 250.- 11 reporting
R & D	1	-	1	-	2		
Technical operator	1	-	-	-	1		
Teaching	-	-	-	1	1		
Programming	2	1	-	-	3		
Unrelated to astronomy:							
Programming	2	1	-	-	3	54%	\$1 100.- 13 reporting
Data analysis	5	-	1	-	6		
Res. & dev	-	-	1	-	1		
Flight training	-	1	-	-	1		
Teaching	-	-	-	1	1		
Unskilled	1	-	-	-	1		
Total	13	4	5	2	24	100%	